NPIC/TSG-064/70
10 SEP 1970

MEMORANDUM FOR: Director, National Photographic Interpretation Center

SUBJECT : Request for Approval of a Contract for Laboratory Controlled Imagery for the Determination of Color Imagery Characteristics, with [redacted] at a Cost of [redacted] from FY-1971 R&D Funds

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1. This memorandum requests the approval of funds for an R&D contract. The specific request is stated in Paragraph 8.

2. The purpose of the overall image quality program is to provide physical measures of performance which correlate well with the psychophysical evaluations of imagery quality made by imagery interpreters and photo technicians. While this objective has not been fully achieved with black-and-white imagery, measurable progress has been made and the need for a similar effort with the more complex color images is clearly evident.

3. The technical description of the image produced on black-and-white film is dependent upon: the energy falling on the film, the processing of the film, and the measuring technique used to describe density and other characteristics of the material. To facilitate data comparison among workers, standard exposing, processing and measuring techniques have been agreed on: while this approach has not yet solved the problem of specifying every aspect of image quality in detail, it has resulted in substantial areas of agreement among quality control and systems design engineers.

4. With the introduction of color film the situation becomes more complex; i.e., the image is dependent not only upon the total energy impact on the film but upon the wavelength, or color, of that energy as well. This means that evaluation techniques must take into account not one but four input variables along with the various interactions which occur. As with black-and-white films, a variety of

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standard objects and analytical techniques are required. Some have been developed by the manufacturer for use in process and printer control; however, essential questions related to optimum color balance, defect analysis, fine detail response, psychophysical quality, noise characteristics and information content, remain to be answered. As with the acquisition systems, these data can only be gathered initially through static testing under laboratory conditions where the input and output variables are known and can be controlled. This allows quantitative comparison of laboratory and operational test data. [redacted] has taken this approach with black-and-white film reproduction quality studies performed for Westover AFSPPF. NPIC personnel have conducted detailed discussions with Westover and have been informed that due to the heavy expenditures in expanding the Westover facilities for bulk color processing, the Westover budget will not permit funding the proposed study during the coming year. Since Westover has shared the information gained on the black-and-white quality studies with NPIC, and since the studies are of mutual benefit to both parties, it was suggested that NPIC attempt to fund the proposed color study with the full knowledge and support of Westover. The [redacted] proposal to extend the black-and-white techniques to color imagery is discussed below.

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5. The proposed project is concerned with the production of a set of standard, original color film transparencies (SO-242) for use as calibrated test objects (inputs) in future color image evaluation experiments. The test imagery will be produced by photographing an existing [redacted] scale model (see attachment) under simulated operational acquisition conditions, varying the quality of the imagery in a precise and known manner. To assure the suitability of the imagery produced, some subjective analysis and scaling will be performed in addition to evaluating the physical data collected. These calibrated images will be employed as known inputs during the analysis phase of each project concerned with color imagery standards, e.g., reproduction, viewing systems, color control

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cell, color training, etc. In this way, a common quantitative reference will be established for: comparison with black-and-white imagery, the development of optical and digital manipulation techniques, the investigation of color power spectral density characteristics, and the correlation of physical and psychophysical quality measures of image quality.

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6. [redacted] was selected for this work to take advantage of their existing color model and the data already collected in connection with their black-and-white experiments for AFSPPF. Accordingly, the risk involved in their ability to perform the task is very small. This is a fixed price contract; therefore, there is no danger of overrunning the cost. It is for these reasons that no other proposals were solicited. No direct follow-on with [redacted] is anticipated.

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7. [redacted] will be project officer for this contract. [redacted] is appropriate for this work; the Project Officer will assign security classifications to specific tasks and resultant end items.

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8. It is requested that approval be granted for a contract to be negotiated with [redacted], for production of a set of standard transparencies in accordance with their attached proposal, not to exceed [redacted] from Category IV FY-1971 Funds.

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[redacted]

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Colonel, USAF
Acting Chief, Technical Services Group,
NPIC

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Attachments:
1. Proposal
2. Form 2420 [redacted]

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APPROVED: _____ 30 Sept 70
ARTHUR C. LUNDAHL Date
Director
National Photographic Interpretation Center

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